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PATENT ABSTRACTS OF JAPAN

(11)Publication number : 64-003082

(43)Date of publication of application : 06.01.1989

(51)Int.Cl. C04B 37/00
H01R 4/68

(21)Application number : 62-157041

(22)Date of filing : 24.06.1987

(71)Applicant : HITACHI CABLE LTD

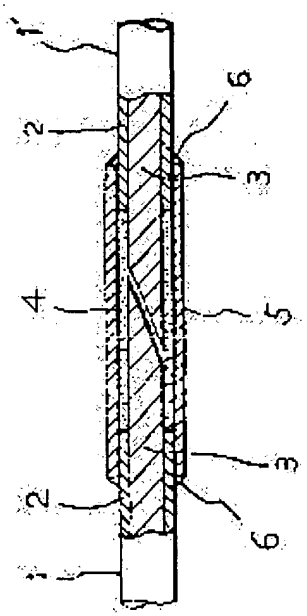
(72)Inventor : NAGAI MASAHIRO

(54) CONNECTING PART OF SUPERCONDUCTIVE ELECTRIC WIRE MATERIAL

(57)Abstract:

PURPOSE: To readily form a connecting part having stable contact and high reliability in connecting a superconductive electric wire material, by using fine powder of a superconductive material of metallic oxide type having he same composition as that of the superconductive electric wire material.

CONSTITUTION: Stabilizing materials 2 (copper and alumina) at the tip parts of superconductive electric wire materials 1 and 1' to be connected are released and the top parts of opened core materials 3 are slantingly cut. Then, a sleeve 5 made of the same material as that of the stabilizing materials 2 is put on the vicinity of one of the superconductive electric wire materials 2, both the tip parts of the core materials 3 are placed opposite and slurry consisting of fine powder of a superconductive material of a metallic oxide having the same composition as that of the superconductive electric wire materials 1 and 1' are applied to gap between the core materials and the outer periphery. The slurry is coated, dried and burnt at about 850° C for about 2hr to give a superconductor 4. The superconductor is cooled after burning, the sleeve 5 is returned to the former position and the end part of the sleeve is integrated with the superconductive electric wire materials 1 and 1' by a soldering material 6. Consequently, the connecting part of the core materials 3 is covered with the sleeve 5, integrating strength is increased and the connecting part is thermally and electrically stabilized.



LEGAL STATUS

[Date of request for examination]

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[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of

DERWENT-ACC-NO: 1989-051951
DERWENT-WEEK: 198907

TITLE: Connection of superconductive wire - uses metal oxide material having
similar compsn. to superconductive wire

PATENT-ASSIGNEE: HITACHI CABLE LTD[HITD]

PRIORITY-DATA: 1987JP-0157041 (June 24, 1987)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 64003082 A	January 6, 1989	N/A	003	N/A

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP64003082A	N/A	1987JP-0157041	June 24, 1987

INT-CL_(IPC): C04B037/00; H01R004/68

ABSTRACTED-PUB-NO: JP64003082A
BASIC-ABSTRACT: Connecting of superconductive wire made of structural or
stabilising metal added metal oxide superconductive core material uses powder
of metal oxide material having similar compsn. to superconductive wire.

USE - Excessive stress is not applied on the connection of wire so that highly
reliable connection with stabilised contact is available.

CHOSEN-DRAWING: Dwg.1/1

TITLE-TERMS:
CONNECT SUPERCONDUCTING WIRE METAL OXIDE MATERIAL SIMILAR COMPOSITION
SUPERCONDUCTING WIRE

DERWENT-CLASS: L03 V04 X12

CPI-CODES: L03-A01C;

EPI-CODES: V04-A09; X12-D06;

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1989-023191
Non-CPI Secondary Accession Numbers: N1989-039697

(19) JAPANESE PATENT OFFICE

(4)

PATENT ABSTRACTS OF JAPAN

(11) Publication number: **64003082 A**

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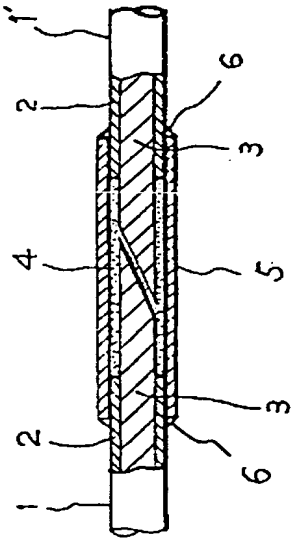

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⑲日本国特許庁（JP）　⑪特許出願公開

⑫公開特許公報（A）　昭64－3082

⑤Int.Cl.⁴	識別記号	庁内整理番号
C 04 B 37/00	ZAA	A－8317－4G
H 01 R 4/68	ZAA	6465－5E

⑬公開　昭和64年(1989)1月6日

審査請求　未請求　発明の数 1　(全3頁)

⑭発明の名称　超電導線材の接続部

⑳特　願　昭62－157041

㉒出　願　昭62(1987)6月24日

㉓発明者　永井　雅大　茨城県土浦市木田余町3550番地　日立電線株式会社金属研究所内

㉑出願人　日立電線株式会社　東京都千代田区丸の内2丁目1番2号

㉔代理人　弁理士　薄田　利幸

明　細　書

1．発明の名称　超電導線材の接続部

2．特許請求の範囲

(1) 金属酸化物系超電導芯材に構造用または安定化用の金属材が付加された超電導線材の接続部において、芯材同志をこれと同じ組成の金属酸化物系超電導材の微粉末を介して接続してなることを特徴とする超電導線材の接続部。

(2) 金属酸化物系超電導材の微粉末が焼成されている、前記第1項記載の接続部。

(3) 芯材の接続の外周がスリーブで覆われている、前記第1項または第2項記載の接続部。

(4) スリーブが超電導線材とろう付けされている前記第1項記載の接続部。

3．発明の詳細な説明

〔産業上の利用分野〕

本発明は金属酸化物系超電導線の接続部に関するものである。

〔従来技術とその問題点〕

合金系あるいは金属間化合物系の超電導材を用いた超電導の接続は、一般に超電導材を露出させ、これを重ね合わせてろう付けするか、スリーブ圧縮する方法が採られている。この方法を、最近発見されたペロブスカイト型の結晶構造をもつ金属酸化物系の超電導材、例えばY－Ba－Cu－Oの組成による超電導材を用いた超電導線の接続に適用しようとすると次のような問題を生じる。

(1) 金属酸化物系の超電導材は、融点が高いので、ろう付けしても超電導体自体には何ら変質がなく、ろう材で二つの超電導体を固めたにすぎず、単に接触させたものと効果は大差ない。

(2) 金属酸化物系の超電導材は脆いので、スリーブ圧縮時に破損する確率が高く、常に良好な接続が期待できるとは限らない。

〔発明の目的〕

本発明は斯かる点に鑑みなされたもので、その目的とするところは、接続が確実で、失敗の恐れのない安定した接続部を提供することにある。

〔発明の概要〕

上記目的を達成するため、本発明では、超電導線材の接続に、該超電導線材と同じ組成を有する金属酸化物系超電導材の微粉末を用いるようにした。

このようにすれば、接続作業において、例えば補強用および／または安定化用の金属スリーブ内に、その微粉末を充填し、スリーブの両端から接続端部を圧入し、金属スリーブと接続端部付近の補強用および／または安定用の金属材をろう付けするか、あるいは、接続端部に前記微粉末のスラリーを塗布し、その乾燥後、これを焼成して接続端部を固着する等することにより容易に安定した接続部を得ることができる。

尚、金属酸化物系超電導材としては、Ba－La－Cu－O、La－Sr－Cu－O、La－Ca－Cu－O、Y－Ba－Cu－O、Yb－Ba－Cu－O、Sc－Ba－Cu－O等の超電導遷移温度の高いものが用いられる。

〔実施例〕

図面を参照して本発明の接続部を説明するに、第1図において1，1′は銅，アルミ，銀等の安定化材2の中に例えばY－Ba－Cu－Oの組成が金属酸化物超電導材からなる芯材3をもつ超電導線材、5は安定化材2と同じ材質からなるスリーブ5を超電導線材1，1′と一体化するろう材、4は芯材3同志を接続する金属酸化物超電導体である。

この接続部の形成作業にあたっては、接続すべき超電導線材1，1′の先端部の安定化材2を剥離した後、露出した芯材3の先端部を斜めに切断する。しかる後、一方の超電導線材の端部付近にスリーブ5を挿通して芯材3の両先端を突合せ、端面間及び外周に別途用意した金属酸化物超電導材のスラリーを塗布する。

このスラリーは、芯材3と同じ組成の金属酸化物系超電導材からなる微粉末に水，アルコール等の溶媒を加えて混練したもので、このスラリーは塗布，乾燥後、例えば850℃で2時間焼くことにより、超電導体4となる。

冷却後、スリーブ5を引き戻してその端部を超電導線材1，1′とろう材6で一体にろう付けする。これにより、芯材3の接続部はスリーブ5で覆われ、一体化強度が増し、熱的にも電気的にも安定したものとなっている。

この例は接続作業にあたって安定化材2を剥離しているが、そうせずに線材1，1′の端部を直接斜めに切断して同様に接続してもよい。

金属酸化物系超電導材料は、一度焼成した後粉末にしても超電導特性が保たれる。従って、スラリーとして塗布する代りに、スリーブ5内に充填し、両端から超電導線材1，1′を圧入した後スリーブ5と超電導線材1，1′をろう付けするようにしてもよい。

〔発明の効果〕

以上説明したように、本発明によれば、金属酸化物超電導材の微粉末を用いて接続部を構成したものであるから、無理な応力が加わらず、接触の安定した信頼性の高い接続部を容易に得ることができる利点がある。

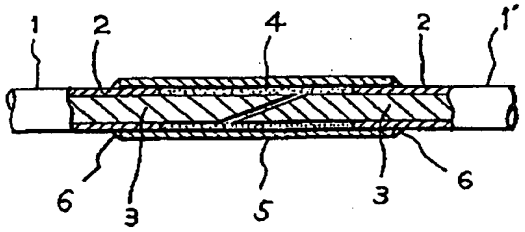
4．図面の簡単な説明

第1図は本発明に係る接続部の一実施例を示す説明図である。

1，1′：超電導線体、
2：安定化材、
3：金属酸化物超電導材からなる芯材、
4：金属酸化物超電導材の微粉末を焼成した超電導体、
5：スリーブ、
6：ろう材。

代理人　弁理士　薄田利幸

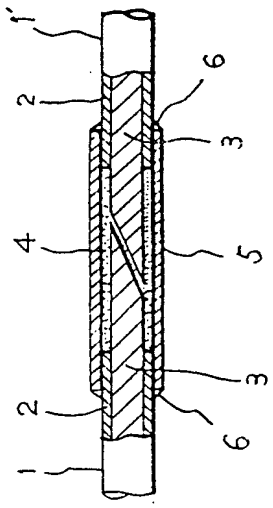
第１図



1：超電導線材
2：安定化材
3：芯 材
4：微粉末を焼成した
超電導体
5：スリーブ
6：ろう材

(54) **CONNECTING PART OF SUPERCONDUCTIVE ELECTRIC WIRE MATERIAL**

(11) **64-3082 (A)** (43) 6.1.1989 (19) JP
(21) Appl. No. 62-157041 (22) 24.6.1987
(71) HITACHI CABLE LTD (72) MASAHIRO NAGAI
(51) **Int. Cl⁴. C04B37/00,H01R4/68**

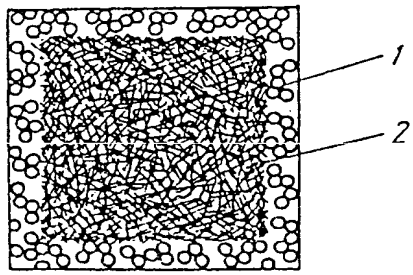


PURPOSE: To readily form a connecting part having stable contact and high reliability in connecting a superconductive electric wire material, by using fine powder of a superconductive material of metallic oxide type having he same composition as that of the superconductive electric wire material.

CONSTITUTION: Stabilizing materials 2 (copper and alumina) at the tip parts of superconductive electric wire materials 1 and 1′ to be connected are released and the top parts of opened core materials 3 are slantingly cut. Then, a sleeve 5 made of the same material as that of the stabilizing materials 2 is put on the vicinity of one of the superconductive electric wire materials 2, both the tip parts of the core materials 3 are placed opposite and slurry consisting of fine powder of a superconductive material of a metallic oxide having the same composition as that of the superconductive electric wire materials 1 and 1′ are applied to gap between the core materials and the outer periphery. The slurry is coated, dried and burnt at about 850°C for about 2hr to give a superconductor 4. The superconductor is cooled after burning, the sleeve 5 is returned to the former position and the end part of the sleeve is integrated with the superconductive electric wire materials 1 and 1′ by a soldering material 6. Consequently, the connecting part of the core materials 3 is covered with the sleeve 5, integrating strength is increased and the connecting part is thermally and electrically stabilized.

(54) **POROUS MATERIAL OF SILICON CARBIDE AND PRODUCTION THEREOF**

(11) **64-3083 (A)** (43) 6.1.1989 (19) JP
(21) Appl. No. 62-157521 (22) 26.6.1987
(71) TOKAI KOUNETSU KOGYO K.K.(1) (72) KOJI KAKO(1)
(51) **Int. Cl⁴. C04B38/00**



PURPOSE: To produce a porous material of silicon carbide having high strength and high porosity, by constituting an inner layer part of entangled silicon carbide whiskers and a superficial layer part of granular silicon carbide.

CONSTITUTION: Silicon carbide whiskers (about 0.1～1.0μ diameter and about 30～100μ length) is uniformly dispersed into a dispersion medium to give a molded article having desired voids. The molded article is impregnated with a thermosetting polymer and heated at 800～1,200°C in a nonoxidizing atmosphere to burn and carbonize the thermosetting polymer. Then the resulting material is heat-treated in an oxidizing atmosphere at ≦800°C, carbon dispersing on the superficial layer part of the molded article is burnt and removed, the resulting material is heat-treated in a nonoxidizing atmosphere at 1,800～2,200°C, the whiskers on the superficial layer part are converted into a granular state to form a high-strength superficial part 1 and to maintain an inner layer part 2 in a whisker state. Further the resultant material is heat-treated in an oxidizing atmosphere at ≦800°C for a proper time to burn and to remove free carbon remaining in the porous material. Consequently, a porous material of silicon carbide suitable for filters for various filtrations is obtained.

(54) **PRODUCTION OF MICROPOROUS CERAMIC POROUS BODY**

(11) **64-3084 (A)** (43) 6.1.1989 (19) JP
(21) Appl. No. 63-52412 (22) 5.3.1988 (33) JP (31) 87p.51684 (32) 5.3.1987
(71) AGENCY OF IND SCIENCE & TECHNOL (72) YACHIHO SEKI(2)
(51) **Int. Cl⁴. C04B38/00**

PURPOSE: To produce a ceramic porous body having high porosity and fine pore size and being homogeneous and free from deformation and crack in good productivity, by pressurizing, molding and burning an ultrafine ceramic powder using a specific lubricating organic liquid substance as a molding medium.

CONSTITUTION: A lubricating organic liquid substance such as aliphatic, alicyclic or aromatic hydrocarbon, alcohols, esters or silicone having 2～100 centistokes poise at 37°C and 70～700 average mol.wt. is added to 0.005～2.5μm ultrafine power of ceramics consisting of Al_2O_3, SiO_2, ZrO_2, TiO_2, SiC, Si_3N_4, BN and the others as a molding medium at a ratio of 65～330wt.% and the blend is kneaded and molded under pressure and burned at 500～1,400°C. The molding medium is gasified and loosen at high temperature and ultrafine ceramic porous body having 60～90% average porosity can be simply produced in good productivity.